

REED. (R. H.)

al

[Reprinted from the Columbus Medical Journal of January, 1888.]



SOME NEW OPERATIONS IN ABDOMINAL SURGERY, ILLUSTRATED WITH A NUMBER OF SPECIMENS.

BY R. HARVEY REED, M. D.,* MANSFIELD, O.

A Paper read before the Annual Meeting of the Muskingum Valley Medical Association, held at Zanesville, O., Nov. 29th, 1887.

The day of "expectant treatment" of wounds of the abdominal viscera is far spent; and opium must soon give place to the knife of the skilled surgeon and the antiseptic dressing.

Notwithstanding the feeble protection afforded the abdominal viscera, and their great liability to injury from various sources, and the vitally important part they play in the human economy, yet it was not until recently that we have had what might be considered a satisfactory and practical method furnished us for the treatment of the many wounds and maladies incident to these viscera.

Practically speaking, it is only a few years since surgeons were forbidden to open the abdomen and search for injuries of the viscera; but on the contrary were content with stupefying the patient with opium (which was designated by the flowery title of "locking up the bowels," and which seldom allowed them to be unlocked this side of eternity), and insisting on perfect quiet, and trusting to Dame Nature for results.

Mortifying as these results have usually been, yet the benefits from operative interference were little if any better, and few surgeons dared

*Surgeon-in-Chief Transportation Department, B. & O. R. R., west of the Ohio River.

Presented by the author.

to break the easy old rule of "locking up the bowels" and "waiting for something to turn up."

The obstacles in the way of studying anatomy in earlier times, and the necessity for a thorough knowledge of the human body, was no doubt an insurmountable barrier, for the time at least, in the path of the progressive surgeon of the thirteenth and fourteenth centuries, to which we might well add the prejudices against experimenting on the lower animals (which exist too abundantly at the present day in many localities), but which have at last been the door that has let the profession out of the dungeon of ignorance and false theories in the treatment of wounds of the abdominal viscera, into the daylight of truth and practical wisdom.

The day has come when every active, progressive surgeon should have his laboratory for vivisection, and there study out every intricate problem that may puzzle him in his daily practice. It is largely by such means that we have attained to what we know at the present day of many intricate problems of surgery, and it is only by the continuation of such investigations that we can solve those problems that are yet puzzling the surgeons of to-day.

I could, to a certain extent, appreciate the difficulties under which the surgeons of a century and a half ago labored when I was told by a prominent surgeon of Bath, England, at the recent International Medical Congress, in speaking of vivisection, that if he or his colleagues were to attempt vivisection in his country as Americans do in this country, they would be put in prison before twenty-four hours, to which he added, "and I can now see how it comes that you Americans are taking the lead in surgery, and will, until we can have the privilege of performing the same experiments on animals you have the privilege of performing in America."

What a "golden hint" these few suggestions should be to the progressive, investigating surgeons of this country, who, I trust, will not fail to improve the opportunities they so liberally enjoy.

It is not only interesting, but instructive, to study the tardy progress toward practical success in operations on the abdominal viscera from the complicated loop sutures of Palfyn, in 1710, and Ledran, in 1742, to the common interrupted suture of the present day. All manner of devices were tried in the suturing of the intestines, from the wooden plates of Reybard, and the playing card splint of Sabatier, to the elder-wood canula of Theodoric and the calf's trachea brace of Duverger.

Nor were the minds of the surgeons confined to the suturing of the

bowels alone; its union after division was of even more importance. As early as 1730 we find Ramdohr removing a large section of the intestine of a soldier, and simply inserting the upper end within the lower, and fastening it there, and getting union with recovery; but this operation, when weighed in the balance of practical experience, was found unsuccessful.

The mucous membrane of the inside of the bowel would seldom unite with the serous membrane of the outside of the bowel, which with other obstacles caused the procedure to be abandoned, although a modification of the invagination method was tried by Jobert and Reybard, yet all without practical success.

In 1824, Jobert conceived the idea of turning the serous membrane of the cut end of the lower portion of the bowel in, so that when the upper end of the bowel was invaginated into it, the two serous surfaces would come in contact, instead of a mucous and a serous membrane, as in the operation by Ramdohr. Although experimented on by Reybard, Begin and Gross, the operation was abandoned on account of "the uncertainty of its results, and the impossibility of distinguishing the lower extremity of the intestine with certainty."

In 1826, Denans endeavored to unite the bowel by the use of three metallic cylinders, one in each end of the bowel, a portion of which is doubled into each cylinder, and a third cylinder inserted into the end of each of the other two, and fixed there temporarily until the union of the serous surface would take place, and sloughing of all that portion that lay between the cylinders, which, with the cylinders themselves, were passed per rectum; yet the dangers and uncertainty of this operation soon condemned it.

We will not stop to describe Lembert's method, which was really a modification of Jobert's, and Gely's, which was only a modification of Lembert's. Amussat tried to improve on Denans's method by using a cork in the place of the three metallic cylinders, and yet, to sum it all up in a few words, none of these methods filled the surgeon with enthusiasm, or gave him courage and confidence in the treatment of wounds of the intestines.

Dr. Parks, of Chicago, has well said, even so late as 1884, "it is scarcely necessary for me to affirm in your presence the fact that with few exceptions the older writers and surgeons advocate the 'expectant treatment' in the management of wounds in the intestines." And in 1883,

he conducted a valuable series of experiments "for the purpose of ascertaining the results to be obtained by immediate operations after these wounds, with the hope that the relation of attending circumstances and events would be interesting as well as useful, by adding to the data now in our possession other data from which may be determined more intelligently the course of action to be adopted when these cases come under our charge for treatment."

After a series of experiments, the same author says in his address before the American Medical Association, in 1884, in regard to suturing the bowel after bullet wounds "this way (that is the use of continuous suture) of treating the bullet openings in the bowel is susceptible of much wider application that would appear possible at first glance. I am quite well satisfied that it will take the place of excision in not a few cases of quite severe injury. The torn edges of the wound can be turned in, and the peritoneal surfaces fastened together, even in large wounds, with perfect confidence in the result of safe and secure adhesion following."

In the same article, he sums up the impressions made on his mind by these experiments, and says: "The fact is that it makes no difference whatever, what kind of suture is used, so that the principle of positively securing the application of two broad surfaces of peritoneum in contact with each other is certainly carried out."

As he has well said, the success did not depend on the kind of suture used so much as it did on the careful coaptation of the serous surfaces and their being kept in that position without extravasation or hemorrhage, until union was effected.

In a paper read before the surgical section of the recent International Medical Congress, Dr. Parks, in speaking of the uniting of the intestine, says: "My experience from experimental inquiry was positively in favor of two methods of procedure:—

"First. Cases in which the mesenteric border could not be saved were most successfully treated by making the section in healthy bowel tissue, and removing the injured portion with a triangular piece of the mesentery, the base of the triangle representing the length of the intestine removed."

He then commenced at the mesenteric border to insert his sutures, and says he never found it necessary to introduce more than one row of sutures, which he inserted so as to include "about one-third of an inch of peritoneum with the underlying muscular coat, and the sutures were placed about one-eighth of an inch apart.

"*Second.* Cases in which the mesenteric, or nutritive border can be saved — a plan which I have successfully adopted experimentally is as follows: The wounded part is cleanly cut out, leaving the uninjured mesenteric portion. From this the mucous membrane is stripped, and the muscular coat with its peritoneal covering drawn downward in a loop. This loop is closed with stitches, and the bowel circumference remaining fastened, as in complete resection."

Whilst Dr. Parks' experiments have developed valuable facts, and his method is a marked improvement over the various methods preceding his experimental researches, yet the long row of stitches and the danger of failure in getting the serous membrane properly and completely adjusted, renders it anything but a faultless operation, or one that could be fearlessly relied upon by the every-day surgeon.

To the practical originality of Prof. N. Senn, of Milwaukee, Wis., the profession of the world is indebted for some of the most remarkable advancements in intestinal surgery that the world has yet seen; and to him this association is indebted for the score or more of beautiful specimens I have the privilege of exhibiting to you this afternoon. For years this inveterate investigator has been quietly experimenting in this direction. The result of his labors he gave to the world in a most interesting and valuable paper read before the surgical section of the Ninth International Medical Congress, and the specimens I shall exhibit to you are only some of the actual results of his many carefully conducted experiments, and are simply silent witnesses of his inventive genius and practical skill.

You will observe here in these adhesive experiments with what rapidity and firmness the serous surfaces of the bowels have been cemented together; even where there has been no scarification whatever, there has been firm union in twenty-four hours by simply binding one surface to the other, and holding them thus in apposition; but where there has been scarification of one or both of the serous surfaces, you will notice the adhesion has been more determined.

Here is a unique specimen showing the result of a V-shaped portion taken from the convex side of the bowel, the animal being killed 43 days after. You will notice the marked bulging at the mesenteric attachment as well as the complete union of the edges of the bowel.

The next group of specimens shows the result of lateral implantation experiments. The first one, marked "Exp. B.," is the result of an ileocolostomy in which the Czerny-Lembert suture was used, the animal being killed at the end of the 33d day. You will notice how completely

the union has taken place, and the progress of the sutures in their escape into the inside of the bowel after they have completed their work.

By experiment 21, you will notice the results of the Czerny-Lembert suture in the lateral implantation experiments, the animal having been killed on the 21st day. In this specimen you will notice that the union is perfect, and all but one or two of the sutures have disappeared.

Example H. is almost a duplicate of the last (21), excepting there is acute flexion of the ileum, the Ileo-colostomy having been performed with the Czerny-Lembert suture, and the animal killed in 37 days. The sutures are nearly all intact yet, although the union of the bowel is complete.

Here is an obstruction of the bowel by flexion relieved by an Ileo-colostomy in which the Czerny-Lembert suture was used, and the animal killed in 31 days (experiment V). In this specimen you will observe how perfectly the difficulty has been relieved, the sutures having nearly all been discharged, and the continuity of the bowel and its functions maintained.

Experiment 35, you will notice, is a lateral implantation with inclusion, the animal having been killed in 24 days, yet you will notice the union is perfect. In this experiment you will observe there is not less than three feet of the bowel included which has already begun to atrophy, while the contents of the bowel have been "switched off," as it were, at the point of implantation, leaving the included loop practically abandoned, which in consequence has commenced to undergo physiological degeneration.

The next three are lateral implantation experiments, in which the rubber ring was used, which method I will explain hereafter.

You will readily observe in experiment 97 the physiological exclusion of the discarded bowel referred to above, and whilst the animal was killed in 10 days, the atrophy of the abandoned bowel is more marked than in example 35, and the union of the bowel is complete.

In experiment 81 of this series of lateral implantation specimens, you will notice a piece of bone the dog has eaten, which has lodged in the new opening produced by this operation, while the union of the parts is complete, notwithstanding the animal was killed on the 13th day after the operation.

Experiment 75 is also a lateral implantation experiment, the result of the rubber ring method, and, while it has no special attraction over the

rest of this series of experiments, it adds its testimony in favor of this method of operating.

The next specimen (No. 53) is an ileo-colostomy, in which decalcified bone plates were used in the one specimen, and rubber plates in the other. You will notice in the one where the decalcified bone plates were used, the union is complete, the plates having been digested, as it were, while the sutures are still remaining, although almost discharged from the inside of the bowel. In the other, the rubber plates will be found in place yet, although the union between the two bowels has been completed, and only awaits the loosening of the sutures and the detachment of the rubber plates. In both of these cases the dog was killed on the 14th day.

In experiment 67, we have a gastro-enterotomy produced by the rubber plate process, the animal having been killed on the 14th day. This experiment is a very interesting one, and shows how completely the union has taken place in so short a time, plates, stitches and all having disappeared entirely.

Experiment 69 is an ileo-colostomy produced by the rubber plate method, the dog having been killed on the 25th day, which shows a complete union of the intestine with an escape of the plates and stitches without even a trace of them remaining.

The next two specimens are invaginations; experiment 7 shows a resection on the third day of the invagination and the amount of injury done the bowel in so short a time, while the other shows the results of invagination after 11 days in a cat, and the amount and firmness of the adhesions formed.

Here is a series of five specimens of enterorrhaphy induced by the rubber ring method, which I consider among the most interesting specimens I have to show you to-day:

The first one we come to is the simple union of a divided ileum (Ex. 73), the dog having been killed after 11 days. You will observe how completely the union has taken place. Example 68 is a similar specimen, but shows how the ferule of omentum, which has been thrown around the splice of the bowel, has protected it from extravasation where the coats of the bowel have not yet completely united, the animal having been killed the seventh day. Experiment 76 shows complete union of the intestinal walls with the omental flaps completely adherent around the splice in the intestine, the dog not having been killed until the 25th day. Experiment 85 is almost a duplicate of the one preceding, the dog being killed on the 22d day. The same can be said of experiment 70, only the

dog was killed on the 25th day. In experiment 54 the dog died on the 24th day, and you will observe nature had established a false passage by the side of the ring.

Experiment C. is an exceedingly interesting one, from the fact that 50 inches (over four feet) of the small intestine was removed by excision, and the cut ends of the bowel united by the Czerny-Lembert suture, and complete union established, as you will see, the dog having been killed on the 47th day.

You have no doubt noticed there has been seven general classes of experiments performed, viz :

Adhesion experiments.

V-shaped excision experiments.

Lateral implantation experiments, by Czerny-Lembert suture.

Lateral implantation experiments, by rubber ring method.

Ileo-colostomy, by the decalcified bone plate and rubber plate method.

Invagination specimens.

Enterorrhaphy, by rubber ring method.

The adhesion experiments were performed by simply binding one bowel to the other by plates, and holding them there a given length of time. In some of these experiments neither of the serous surfaces were scarified, and in others both were scarified.

In the V-shaped excision experiments the mesenteric border of the bowel was left intact, while a large V-shaped piece of the bowel was excised, and the edges brought together by the Czerny-Lembert suture, and held there until union was complete.

You will notice in the lateral implantation experiments an opening was cut in the side of one intestine, the edges of which were turned in so as to bring the serous surfaces of these edges in contact with the serous surface of the lateral bowel, which is inserted into the opening, and held there by the Czerny-Lembert suture until union is completed.

In the rubber ring method of performing the lateral implantation experiments, a light rubber ring, say from one-half to three-quarters of an inch broad, is cut open, and stitched together again, and is then inserted into the end of the bowel, which is to be inserted into the slit of its fellow, and is stitched there by a continuous suture, which is "whipped," as it were, over the end of the bowel and rubber ring. The end of the bowel thus prepared is now inserted into the opening made in its fellow, the edges of which have been turned in, as before described, and sutured there until union takes place. You will readily observe the rubber

ring will act as a splint to hold the serous surfaces firmly together, and as soon as the adhesion has taken place, the ring, with the sutures, will come away and pass off in the stools.

The use of the decalcified bone plate in performing an ileo-colostomy as a sort of splint to the bowel, and the method in which it is used by Dr. Senn, are certainly unique. The idea was no doubt suggested by Keybard in 1827, in his crude use of the "oval plate of deal," but the superiority of decalcified bone over that of wood will at once be apparent, as the latter would soon be digested by the bowel, and thus gotten rid of, whilst the former would have to pass out per rectum, with all of its attending dangers.

If you will look at the model I have prepared, you will notice that in performing the operation by this method, two plates of decalcified bone are used, each of an oblong shape, about two inches in length by three-quarters wide, with an opening in the middle extending lengthwise about three-quarters of an inch by one-eighth in width. Four strong threads or ligatures are attached to each of these, one at each end of the opening in the middle of the bone, and one at each side, and all the ligatures brought out on the same side. Having properly closed the end of each bowel to be united, a slit—say about three-fourths of an inch long—is made in the approximate side of each bowel, and extending lengthwise of the intestine. Into each of these slits is slipped the decalcified bone splint; the ligatures at each end of the opening in the splint are brought out through the ends of the slit in the bowel, while the side ligatures, which are armed with needles, as you see, are passed through the bowel at each side of the slit, which not only keeps the slit open, but fixes the splint in each bowel. The bowels are now approximate, so that the slit in each comes opposite the other, and each of the four ligatures is tied tightly to its fellow, which establishes a communication between the two intestines, and which soon become permanently adhered, as you will see by the specimens I have shown you.

The invagination specimens are of no special interest, except to show the extent of the adhesions formed in a given length of time, and the impossibility of relieving a patient thus afflicted by the ordinary "expectant" methods used, except in rare cases.

Even in the old method of operating, these adhesions have been the "spook" that haunted every surgeon; but now you will see by the decalcified bone method these adhesions and the portions of the bowel they involve can be "side-tracked," as it were, and a new channel opened,

and the invaginated portion allowed to undergo physiological atrophy.

The rubber ring method of performing enterorrhaphy is very similar to that employed in the lateral implantation experiments, excepting the end of the bowel, armed with a rubber ring, as before described, is inserted into the side of the bowel, as in the lateral implantation experiments. Before inserting the upper bowel, in which the rubber ring has been properly secured, into the lower bowel, the end of the inferior gut is turned in so that when the superior end of the bowel is inserted into it the serous membranes would be brought in contact with each other and fastened there, with simply a suture on each side, which would include, as you will notice by the model, the walls of both intestines and the rubber ring.

The rubber ring method devised by Prof. Senn is really a modification of the old Jobert method, in which the end of the bowel was turned in so that the serous surfaces would come in contact with each other, but the improvement in the use of the rubber ring, which acts as a splint on the inside of the intestine, and the protection given the bowel by the band of omentum he throws around the outside of it at the point where the splice is made, has so improved and changed the original method as to really secure it the title of a new operation.

REMARKS.

We have learned from these experiments the rapidity with which adhesions go on in the destructive agencies of abdominal injuries, and at the same time how these same adhesions may be turned into valuable account in the reparative process of the same.

We can see how utterly useless it is to even expect the return of an invagination, after twenty-four or thirty-six hours, by the "expectant treatment" of the past, and still further, how hopeless a task it is to even attempt, by surgical interference, the reduction of an invagination, without destroying the continuity of the bowel.

By the same experiments we have learned to successfully "switch off," or "side track," if you please, that portion of the intestine containing the invagination, and by the use of the decalcified bone plate method, establish a new channel between the normal ends of the intestine, and leave nature to take care of the invagination on physiological principles.

In the same manner we can dispose of strictures of the intestine, or non-malignant tumors that cannot be removed, and the like, and thus save

our patients untold distress and misery, and prolong many a valuable life.

We need not fear to perform the lateral implantation operation when necessity demands it, and feel that we are safe in comparison with the methods generally in use heretofore.

When the destruction of the bowel is such as to necessitate complete excision of a portion of it, we can, by employing the rubber ring method of performing enterorrhaphy, remove the injured portion of the intestinal tract, and with comparative safety unite the two ends in such a manner as to avoid all dangers of extravasation, with its attending complications, and at the same time with a reasonable assurance of getting a complete union in a few days, with the recovery of our patient.

A moment's comparison of Prof. Senn's methods of operating on the abdominal viscera, is sufficient, it seems to me, to convince any practical surgeon of their superiority over any of the other methods we have had heretofore for the surgical reparation of abdominal injuries, especially when you find his theories demonstrated by a multiplicity of experimental research, the results of which are before you to-day, in a tangible form, for your careful examination and honest criticisms, and which speak for themselves of the superiority of his methods of operating.

Before closing this modest reflection of the "experimental contributions to intestinal surgery," by Prof. Senn, permit me to offer the suggestion that you procure a copy of his remarkable paper at your earliest opportunity, and study it from beginning to end, and I can assure you that your time will be well spent, and that you will find his paper not only full of novel and original information, but ripe with practical suggestions, ready for the every day surgeon's use; and if you question any of his methods of operating, go to and repeat these wonderful experiments in your own laboratory, and improve on them if you can, or at best, satisfy yourself of their practical value.

Nov. 28th, 1887.

